PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
AMENDMENTS OF THE CLAIMS

(PCT Rule 62 and
Administrative Instructions, Section 417)

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C.20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as International Preliminary Examining Authority

Date of mailing (day/month/year)	
08 March 2000 (08.03.00)	
International application No.	International filing date (day/month/year)
PCT/IL99/00272	20 May 1999 (20.05.99)
Applicant	
BIO-SEAL LTD. et al	

The International Bureau hereby informs the International Preliminary Examining Authority that no amendments under Article 19 have been received by the International Bureau (Administrative Instructions, Section 417).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer

Juan Cruz

Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF DEFECTS IN DEMAND

(PCT Rule 60.1(d))

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as International Preliminary Examining Authority

Date of mailing (day/month/year) 08 March 2000 (08.03.00)	
International application No. PCT/IL99/00272	**International filing date** (day/month/year) 20 May 1999 (20.05.99)
Applicant BIO-SEAL LTD. et al	

The International Bureau hereby notifies the International Preliminary Examining Authority that it has found that the demand is defective for the reasons indicated below:

1. [ ] It does not contain the election of at least one Contracting State bound by Chapter II (Rule 53.2(a)(iv) and 53.7).
2. [ ] It does not permit the identification of the international application to which it relates (Rule 60.1(b)).
3. [ ] It does not contain the required petition (Rules 53.2(a)(i) and 53.3).
4. [ ] It does not contain the required indications concerning the agent as specified in the Annex (Rules 53.2(a)(ii) and 53.5).
5. [ ] It does not contain the required indications concerning the international application as specified in the Annex (Rules 53.2(a)(iii) and 53.6).
6. [ ] It is not submitted in the required language which is _____ (Rule 55.1).
7. [ ] It is not made on the printed form (Rule 53.1(a)).
8. [ ] It is presented as a computer print-out the particulars of which do not comply with the Administrative Instructions (Rule 53.1(a)).
9. [X] It does not contain the required indications concerning the applicant as specified in the Annex (Rules 53.2(a)(ii) and 53.4).
10. [ ] It does not contain the required signature as specified in the Annex (Rules 53.2(b) and 53.8).

Other observations, if necessary:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorised officer

Juan Cruz

Telephone No.: (41-22) 338.83.38

NOTIFICATION OF DEFECTS IN DEMAND

Int[illegible]ional application No.
PCT/IL99/00272

Continuation of item 4: As to indications concerning **the agent** (Rule 4.4), the demand:

a. ☐ does not properly indicate the agent's name (specify):

b. ☐ does not indicate the agent's address.

c. ☐ does not properly indicate the agent's address (specify):

Continuation of item 5: As to indications concerning **the international application**, the demand does not indicate:

a. ☐ the international filing date.

b. ☐ the international application number.

c. ☐ the name of the receiving Office, where the international application number was not known to the applicant at the time the demand was filed.

d. ☐ the title of the invention.

Continuation of item 9: As to indications concerning **the applicant** (Rules 4.4 and 4.5), the demand:

a. ☒ does not indicate all the applicants for the elected States.

b. ☐ does not properly indicate the applicant's name (specify):

c. ☐ does not indicate the applicant's address.

d. ☐ does not properly indicate the applicant's address (specify):

e. ☐ does not indicate the applicant's nationality.

f. ☐ does not indicate the applicant's residence.

Continuation of item 10: As to requirements concerning **signature** (Rules 4.15 and 90.4), the demand:

a. ☐ is not signed.

b. ☐ is not signed by all the applicants for the elected States.

c. ☐ is not accompanied by the statement referred to in the check list in Box No. VI of the demand explaining the lack of the signature of an applicant for the election of the United States of America.

d. ☐ is signed by what appears to be an agent/common representative but

☐ the demand is not accompanied by a power of attorney appointing him.

☐ the power of attorney accompanying the demand is not signed by all the applicants for the elected States.

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF RECEIPT OF RECORD COPY

(PCT Rule 24.2(a))

To:

LANGER, Edward
P.O. Box 410
43103 Raanana
ISRAËL

Date of mailing (day/month/year)	**IMPORTANT NOTIFICATION**
28 June 1999 (28.06.99)	
Applicant's or agent's file reference	**International application No.**
1037	PCT/IL99/00272

The applicant is hereby notified that the International Bureau has received the record copy of the international application as detailed below.

Name(s) of the applicant(s) and State(s) for which they are applicants:

BIO-SEAL LTD. (for all designated States except US)
INGMAN, Dov et al (for US)

International filing date	:	20 May 1999 (20.05.99)
Priority date(s) claimed	:	21 May 1998 (21.05.98)
Date of receipt of the record copy by the International Bureau	:	09 June 1999 (09.06.99)
List of designated Offices	:	

AP :GH,GM,KE,LS,MW,SD,SL,SZ,UG,ZW
EA :AM,AZ,BY,KG,KZ,MD,RU,TJ,TM
EP :AT,BE,CH,CY,DE,DK,ES,FI,FR,GB,GR,IE,IT,LU,MC,NL,PT,SE
OA :BF,BJ,CF,CG,CI,CM,GA,GN,GW,ML,MR,NE,SN,TD,TG
National :AE,AL,AM,AT,AU,AZ,BA,BB,BG,BR,BY,CA,CH,CN,CU,CZ,DE,DK,EE,ES,FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KP,KR,KZ,LC,LK,LR,LS,LT,LU,LV,MD,MG,MK,MN,MW,MX,NO,NZ,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,UA,UG,US,UZ,VN,YU,ZA,ZW

ATTENTION

The applicant should carefully check the data appearing in this Notification. In case of any discrepancy between these data and the indications in the international application, the applicant should immediately inform the International Bureau.

In addition, the applicant's attention is drawn to the information contained in the Annex, relating to:

- [X] time limits for entry into the national phase
- [ ] confirmation of precautionary designations
- [X] requirements regarding priority documents

A copy of this Notification is being sent to the receiving Office and to the International Searching Authority.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer:
Ingrid Aulich

Telephone No. (41-22) 338.83.38

PATENT COOPERATIO.. TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 08 March 2000 (08.03.00)	
International application No. PCT/IL99/00272	**Applicant's or agent's file reference** 1037
International filing date (day/month/year) 20 May 1999 (20.05.99)	**Priority date** (day/month/year) 21 May 1998 (21.05.98)
Applicant INGMAN, Dov et al	

1. The designated Office is hereby notified of its election made:

   [X] in the demand filed with the International Preliminary Examining Authority on:

   20 December 1999 (20.12.99)

   [ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

   [ ] was not

   made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Juan Cruz
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To: EDWARD LANGER
P.O. BOX 410
RAANANA, ISRAEL 43103

PCT

NOTIFICATION OF TRANSMITTAL OF INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

Date of Mailing *(day/month/year)* 07 JUN 2000	
Applicant's or agent's file reference 1037	IMPORTANT NOTIFICATION

International application No.	International filing date *(day/month/year)*	Priority Date *(day/month/year)*
PCT/IL99/00272	20 MAY 1999	21 MAY 1998

Applicant
BIO-SEAL LTD.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices)(Article 39(1))(see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/US	Authorized officer
Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	H. THI LE DEBORAH THOMAS PARALEGAL SPECIALIST
Facsimile No. (703) 305-3230	Telephone No. (703) 308-0651

Form PCT/IPEA/416 (July 1992)*

REPLACED BY ART 34 AMDT

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 1037	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/IL99/00272	International filing date *(day/month/year)* 20 MAY 1999	Priority date *(day/month/year)* 21 MAY 1998
International Patent Classification (IPC) or national classification and IPC Please See Supplemental Sheet.		
Applicant BIO-SEAL LTD.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets.

   ☑ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 16 sheets.

3. This report contains indications relating to the following items:

   - I [X] Basis of the report
   - II [ ] Priority
   - III [ ] Non-establishment of report with regard to novelty, inventive step or industrial applicability
   - IV [ ] Lack of unity of invention
   - V [X] Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI [X] Certain documents cited
   - VII [ ] Certain defects in the international application
   - VIII [ ] Certain observations on the international application

Date of submission of the demand	Date of completion of this report
20 DECEMBER 1999	18 APRIL 2000
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer H. THI LE DEBORAH THOMAS PARALEGAL SPECIALIST Telephone No. (703) 308-0651

Form PCT/IPEA/409 (cover sheet) (July 1998)★

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/IL99/00272

I. Basis of the report

1. With regard to the **elements** of the international application:*

[ ] the international application as originally filed

[X] the description:
pages 1-31 , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of

[X] the claims:
pages NONE , as originally filed
pages NONE , as amended (together with any statement) under Article 19
pages 32-47 , filed with the demand
pages NONE , filed with the letter of

[X] the drawings:
pages 1-16 , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of

[X] the sequence listing part of the description:
pages NONE , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

[ ] the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

[ ] the language of publication of the international application (under Rule 48.3(b)).

[ ] the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

[ ] contained in the international application in printed form.

[ ] filed together with the international application in computer readable form.

[ ] furnished subsequently to this Authority in written form.

[ ] furnished subsequently to this Authority in computer readable form.

[ ] The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

[ ] The statement that the information recorded in computer readable form is identical to the writen sequence listing has been furnished.

4. [X] The amendments have resulted in the cancellation of:

[X] the description, pages NONE

[X] the claims, Nos. NONE

[X] the drawings, sheets/~~fig~~ NONE

5. [X] This report has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

** Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

***Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/IL99/00272

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. statement

Novelty (N)	Claims	1-93	YES
	Claims	NONE	NO
Inventive Step (IS)	Claims	1-93	YES
	Claims	NONE	NO
Industrial Applicability (IA)	Claims	1-93	YES
	Claims	NONE	NO

2. citations and explanations (Rule 70.7)

Claims 1-93 meet the criteria set out in PCT Article 33(2)-(4), because the prior art does not teach or fairly suggest a composition comprising nanoparticles of hydrated oxide and a biological tissue.

---------- NEW CITATIONS ----------

US 4,849,223 A (PRATT et al) 18 JULY 1989, see entire document.

VI. Certain documents cited

1. Certain published documents (Rule 70.10)

Application No. Patent No.	Publication Date *(day/month/year)*	Filing Date *(day/month/year)*	Priority date (valid claim) *(day/month/year)*
US 5,968,529 A	19 OCTOBER 1999	02 JULY 1997	NONE
US 5,780,224 A	14 JULY 1998	29 APRIL 1994	NONE

2. Non-written disclosures (Rule 70.9)

Kind of non-written disclosure	Date of non-written disclosure *(day/month/year)*	Date of written disclosure referring to non-written disclosure *(day/month/year)*

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

CLASSIFICATION:
The International Patent Classification (IPC) and/or the National classification are as listed below:
IPC(7): B32B 5/16; A61K 9/16, 51/12 and
US Cl.: 428/402, 403; 427/212; 424/1.29, 1.33, 490

I. BASIS OF REPORT:

5. (Some) amendments are considered to go beyond the disclosure as filed:
NONE

CLAIMS:

1. An ultra-disperse nano-particle of a hydrated oxide for use in structuring biological media in a structure comprising:

said particle;

a biological tissue; and

surrounding media,

said structured biological media comprising a three-sided biological system.

2. The particle of claim 1 having a substantially spherical shape.

3. The particle of claim 1 having selective electrical attraction to areas of charge anomaly on said biological tissue surface, so as to coat said areas by providing said stable three-sided biological systems preventing toxin penetration through said tissue surface.

4. The particle of claim 1 having selective electrical attraction to bacterial surfaces, so as to coat said surfaces by providing stable three-sided biological systems preventing bacterial activity including ion or other exchange through the membrane.

5. The particle of claim 1 provided in a powdered form.

6. The particle of claim 5 provided pressed into a pill with an anti-aggregation component for dispersal of said powder upon digestion.

7. The particle of claim 1 provided in a porous bag for submersion in water, said porous bag preventing escape of said particles when dry so as to prevent inhalation of said particles.

8. The particle of claim 1 provided in a capsule with dissolvable walls for use in at least one of swallowing and dissolving in water.

9. The particle of claim 1 having a modified surface structure.

10. The particle of claim 9 its surface hydroxyl groups having undergone partial methylation, providing a particle with a surface which is partially hydrophobic and partially hydrophilic.

11. The particle of claim 10 producing an IR spectrum with a peak at 3750 nm showing percentage hydrophilicity and a peak at 2980 nm showing percentage hydrophobicity.

12. The particle of claim 1 provided in a mechanical mixture of hydrophobic and hydrophilic particles, producing an IR spectrum with a peak at 3750 nm showing percentage hydrophilic particles and a peak at 2980 nm showing percentage hydrophobic particles.

13. The particle of claim 10 provided with approximately 10%-90% hydrophobic surface groups, resulting, conversely in approximately 90%-10% hydrophilic surface groups.

14. The particle of claim 10 provided with an electrical potential affecting ion channels in said biological tissue.

15. The particle of claim 14 a plurality of said particles forming a helical structure.

16. The particle of claim 10 providing a stable thixotropic water-oil emulsion.

17. The emulsion of claim 16 further aerated to provide a water-oil-gas emulsion.

18. The particle of claim 10 provided with interconnected interior channels etched into it causing extremely high surface area per unit solid mass.

19. The particle of claim 18 wherein the ratio of hydrophilic to hydrophobic surface groups is between approximately 0.1 to 0.3.

20. The particle of claim 18 wherein said interconnected interior channels are filled with a component for slow release into said three-sided system.

21. The particle of claim 18 wherein said interconnected interior channels are further etched causing said particle to disintegrate into even smaller nano-particles of under approximately 10 nm in size.

22. The particle of claim 21 wherein said smaller particles are provided with a hydrophilic to hydrophobic surface group ratio of between approximately 0.4 to 0.8.

23. The particle of claim 10 wherein said remaining hydroxyl groups are further modified so as to control at least one of surface charge, pH and electrical potential.

24. The particle of claim 23 wherein said further modifications are provided as protrusions from the particle surface.

25. The particle of claim 24 wherein said protrusions are composed of the same chemical composition as said particle.

26. The particle of claim 24 wherein said protrusions are composed of a different chemical composition than said particle.

27. The particle of claim 24 wherein said protrusions are composed of at least one of metals, nonmetals, macromolecules, antibiotics, vitamins, microelements, and organic material.

28. The particle of claim 24 wherein said protrusions are branched in shape.

29. The particle of claim 28 provided with protrusions with multiple branching sites.

30. The particle of claim 28 wherein said branched protrusions are composed of the same chemical composition as said particle.

31. The particle of claim 28 wherein said branched protrusions are composed of a different chemical composition than said particle.

32. The particle of claim 31 wherein said protrusions are composed of multiple chemical compositions, each composition layered sequentially on a protrusion formed previously.

33. The particle of claim 32 providing a three-dimensional electrical charge spatial template in said media, as determined by said multiple chemical compositions.

34. The particle of claim 24 wherein said protrusions are attached to said particle by a low bonding force such that said protrusions can be detached upon treatment by at least one of exposure to high intensity ultrasound waves and insertion into liquid.

35. The particle of claim 34 wherein said detachable protrusions create nano-particles of under approximately 10 nm in size.

36. The particle of claim 34 wherein said detachable protrusions form an electrostatic interaction.

37. The particle of claim 24 wherein said methylated sites are demethylated and a second set of protrusions of an opposite charge from the first set of protrusions is added, so as to form a particle with two sets of protrusions of opposite charges.

38. The particle of claim 1 having acquired a charge through a double electric layer so as to be capable of electrostatic interaction with regions of a third component.

39. The particle of claim 1 capable of charge reversal depending on the pH of the environment.

40. The particle of claim 1 used for directed action on microorganisms of different types.

41. The particle of claim 1 capable of interaction with at least one of affected cell regions or with bacteria, while said particle retains high absorption capacity and selectivity.

42. The particle of claim 1 capable of adsorbing the toxic substances formed as a result of vital activity and decomposition of a biosystem.

43. The particle of claim 1 provided with dual action, such that any biological function caused by the presence of said particle is followed by a process of at least one of toxic result neutralization, absorption and destruction.

44. The particle of claim 1 characterized by a broad interaction spectrum, from intermolecular to chemical, with at least one of the environment and the boundary of any system located in it.

45. The particle of claim 1 exhibiting, on appearance of a third component of said three-sided biological system, exhibits active, self-organizing properties, thereby responding adequately and selectively to the appearance of said third component and to its charge state, thereby forming a localized stable three component system.

46. The particle of claim 1 exhibiting selectivity of particle action depending on the size and shape of an object, on the charge, on the hydrophilic-hydrophobic pattern and on the availability of functional groups.

47. The particle of claim 1 enabling structurization of the bioenvironment with formation of at least one of locally non-homogeneous regions and nano-size fluctuations.

interacting through a network of three dimensional bonds containing an inorganic particle.

48. The particle of claim 1 forming a three-sided biological system in which structured thixotropic biofluids are analogs of membranes impeding the transport of bacteria, of their nutrients and of dissolved inorganic compounds and ions.

49. The particle of claim 48 forming a stable three dimensional structure in the thixotropic environment when in contact with an inanimate component and form an unstable structure which has variable thixotropy when in contact with a living component.

50. The particle of claim 1 provided with the capacity to be adsorptive and chemisorptive and to form chelates allowing inorganic and organic components to be isolated.

51. The particle of claim 50 having adsorptive capacity for interaction with hydrophobic-hydrophilic regions of bio-objects as well as for specific interaction with components of a living environment.

52. The particle of claim 1 wherein a combination of positively and negatively charged particles are provided for encapsulation of bacteria.

53. The particle of claim 10 wherein said hydrophilic particles are used to inactivate bacteria inside a block of structurized water, with practical disruption of the link between

the bacteria and the environment.

54. The particle of claim 10 wherein said hydrophobic particles are used for at least one of: intermolecular interaction with hydrophobic regions of membranes, supply and removal of oils.

55. The particle of claim 10 provided with a specific hydrophobic-hydrophilic balance on the surface permitting formation of a branched three-dimensional network in a system of non-interactive hydrophobic-hydrophilic environments across the surface of a solid body.

56. The particle of claim 10 provided with a surface with a given hydrophobic-hydrophilic balance causing chemical reactions over specific surface hydroxyl groups with metal chlorides, creating highly non-uniform heterogeneous environments with new thixotropic properties, different charges, different photochemical abilities and other changed properties.

57. The particle of claim 24 formed with a series of layers of active ingredients which are encapsulated in slow-release covers.

58. The particle of claim 52 wherein said active ingredients are released in sequence and a final active ingredient absorbs the results of the reaction.

59. The particle of claim 24 wherein said protrusions form a "lock and key" system whereby an ionic channel is shut, encapsulating a microbe and shielding it from the environment.

60. The particle of claim 24 wherein replacement of the structural hydroxyl groups with at least one of inorganic radicals, and organic radicals including the group of amines, alcohols, iodine, and bromine, leads to formation of bonds of the donor acceptor type, complexes with coordination type charge transfer, covalent bonds and dispersion interaction with the functional radicals of a bio-object.

61. The particle of claim 24 provided in mechanical mixtures wherein particles are differently charged in the presence of water, depending on the pH of the environment, and therefore will interact differently with each other and with specific biomembrane regions.

62. The particle of claim 24 subjected to mechanical mixing, followed by settling of substances with heterogeneous structures in an aqueous environment leading to formation of xerogels with an ultra-heterogeneous pore structure.

63. A method of modifying the surface of ultra-disperse nano-particles of hydrated oxides by partial methylation, said method comprising the steps of:

heat treating said particles in an open vessel at an appropriate temperature so as to remove absorbed and bound structural water;

reacting said heat treated particles with functional organic molecules in the gaseous phase at high temperature so as to methylate surface hydroxyl groups;

removing excess reagent and reaction products;

hydrolyzing unreacted chloride groups on said surface through heating in the presence of saturated water vapor;

heating finally in at least one of an open vessel and an inert atmosphere; and

cooling

such that said nano-particles become modified by partial methylation of their surface.

64. The method of claim 63 wherein the step of reacting said heat treated particles is allowed to continue for between approximately 5 and 60 min at a temperature of approximately between 200-300 °C, the length of said exposure determining percentage of said methylation.

65. The method of claim 63 wherein the step of hydrolyzing is effected at a temperature of between approximately 250-300 °C for a period of approximately one hour.

66. The method of claim 63 wherein said final heating step is effected at a temperature of approximately between 200-300 °C.

67. The method of claim 63 further comprising the step of checking percent methylation by IR spectroscopy, said hydroxyl groups appearing at approximately 3750

nm and said methyl groups appearing at approximately 2980 nm.

68. The method of claim 63 further comprising the step of:

etching non-methylated surface sites so as to create interconnected interior channels providing said particles with high surface per unit mass.

69. The method of claim 63 further comprising the step of further modifying said partially methylated particles by building spike-like protrusions on said surface of said particles in areas which have not been methylated, by heat treating in the presence of a desired component.

70. The method of claim 69 further comprising the step of monitoring control of growth of said protrusions by measuring the intensity of said hydroxyl group peak at 3750 nm through IR spectroscopy.

71. The method of claim 69 wherein said spike-like protrusions are comprised of at least one of SiO_2, Al_2O_3 and TiO_2.

72. The method of claim 69 wherein the step of heat treating in the presence of SiO_2 takes place at a temperature of at least one of 200°C, 400°C and 650°C.

73. The method of claim 69 wherein the step of heat treating in the presence of at least one of Al_2O_3 and TiO_2 takes place at a temperature of between approximately 200-400 °C.

74. The method of claim 69 further comprising the steps of:

heating said particles to between approximately 500-700 °C so as to demethylate said methylated areas of said particle surface, thereby also methylating said spike-like protrusions so as to form a protective cap; and

building a second type of protrusion on said demethylated areas, by heat treatment in the presence of a second component,

so that a second type of protrusion is formed on said demethylated areas.

75. The method of claim 74 further comprising the step of:

reiterating partial methylation of said particle so as to produce branched protrusions.

76. The method of claim 63 further comprising the steps of:

creating drops of approximately 50-100 microns with an ultrasound atomizer,

feeding said drops into a chamber with a layer of said hydrophobic particles such that said drops become coated by said particles due to collision forces; and

introducing said coated drops into an emulsion under turbulent mixing,

such that said hydrophobic particles will allow insertion into an oily medium, resulting in an emulsion with a high water content.

77. The method of claim 76 wherein said step of introducing said coated drops takes place in a gas enriched environment so as to create a water-oil-gas emulsion.

78. The method of claim 77 wherein said gas is at least one of air and ozone.

79. The particle of claim 10 wherein a combination of hydrophilic and hydrophobic particles are provided for use in a toothpaste application.

80. The particle of claim 79 wherein said hydrophilic particles break the adhesive connection between the plaque and the enamel of the tooth.

81. The particle of claim 80 wherein said hydrophobic particles adsorb the plaque released by said hydrophilic particles.

82. The toothpaste of claim 79 further comprising particles with a negative electrical charge for treatment of inflamed gum tissue.

83. The hydrophobic particle of claim 79 further comprising flouride for direct delivery to the tooth enamel.

84. The toothpaste of claim 79 further comprising flouride.

85. The toothpaste of claim 79 wherein said hydrophilic and said hydrophobic particles comprise less than approximately 20% of the total weight.

86. The particle of claim 10 wherein a combination of hydrophilic and hydrophobic particles are provided in a chewing gum for use as a dentrifice.

87. The particle of claim 10 for use in medicinal applications.

88. The particle of claim 10 for use in cosmetic applications.

89. The particle of claim 10 for use in hygiene applications.

90. The particle of claim 10 for use in the food industry.

91. The particle of claim 10 for use in agricultural applications.

92. The particle of claim 10 for use in water treatment applications.

93. The particle of claim 10 for use in disinfection applications.

CLAIMS:

1. A biological media structure comprising:

an ultra-disperse nano-particle of a hydrated oxide;

a biological tissue; and

surrounding media,

said structured biological media comprising a three-sided biological system.

2. The structure of claim 1 wherein said particle has a substantially spherical shape.

3. The structure of claim 1 wherein said particle has selective electrical attraction to areas of charge anomaly on said biological tissue surface, so as to coat said areas by providing said stable three-sided biological systems preventing toxin penetration through said tissue surface.

4. The structure of claim 1 wherein said particle has selective electrical attraction to bacterial surfaces, so as to coat said surfaces by providing stable three-sided biological systems preventing bacterial activity including ion or other exchange through the membrane.

5. The structure of claim 1 wherein said particle is provided in a powdered form.

6. The structure of claim 5 wherein said particle is provided pressed into a pill with an anti-aggregation component for dispersal of said powder upon digestion.

7. The structure of claim 1 wherein said particle is provided in a porous bag for submersion in water, said porous bag preventing escape of said particles when dry so as to prevent inhalation of said particles.

8. The structure of claim 1 wherein said particle is provided in a capsule with dissolvable walls for use in at least one of swallowing and dissolving in water.

9. The structure of claim 1 wherein said particle has a modified surface structure.

10. The structure of claim 9 wherein said particle surface has hydroxyl groups having undergone partial methylation, providing a particle with a surface having methylated sites, said particle surface being partially hydrophobic and partially hydrophilic.

11. The structure of claim 10 wherein said particle produces an IR spectrum with a peak at 3750 nm showing percentage hydrophilicity and a peak at 2980 nm showing percentage hydrophobicity.

12. The structure of claim 1 wherein said particle is provided in a mechanical mixture of hydrophobic and hydrophilic particles, producing an IR spectrum with a peak at 3750 nm showing percentage of hydrophilic particles and a peak at 2980 nm showing percentage of hydrophobic particles.

13. The structure of claim 10 wherein said particle is provided with approximately 10%-90% hydrophobic surface groups, resulting, conversely in approximately 90%-10% hydrophilic surface groups.

14. The structure of claim 10 wherein said particle is provided with an electrical potential affecting ion channels in said biological tissue.

15. The structure of claim 14 wherein a plurality of said particles form a helical structure.

16. The structure of claim 10 wherein said particle provides a stable thixotropic water-oil emulsion.

17. The emulsion of claim 16 further aerated to provide a water-oil-gas emulsion.

18. The structure of claim 10 wherein said particle is etched with interconnected interior channels etched into it causing extremely high surface area per unit solid mass.

19. The structure of claim 18 wherein said particle surface has a ratio of hydrophilic to hydrophobic surface groups between approximately 0.1 to 0.3.

20. The structure of claim 18 wherein said particle interconnected interior channels are filled with a component for slow release into said three-sided system.

21. The structure of claim 18 wherein said particle interconnected interior channels are further etched causing said particle to disintegrate into even smaller nano-particles of under approximately 10 nm in size.

22. The structure of claim 21 wherein said particle in said smaller nano-particles are provided with a hydrophilic to hydrophobic surface group ratio of between approximately 0.4 to 0.8.

23. The structure of claim 10 wherein said remaining hydroxyl groups on said particle surface are further modified so as to control at least one of surface charge, pH and electrical potential.

24. The structure of claim 23 wherein said further modifications are provided as protrusions from said particle surface.

25. The structure of claim 24 wherein said particle protrusions are composed of the same chemical composition as said particle.

26. The structure of claim 24 wherein said particle protrusions are composed of a different chemical composition than said particle.

27. The structure of claim 24 wherein said particle protrusions are composed of at least one of metals, nonmetals, macromolecules, antibiotics, vitamins, microelements, and organic material.

28. The structure of claim 24 wherein said particle protrusions are branched in shape.

29. The structure of claim 28 wherein said particle protrusions have multiple branching sites.

30. The structure of claim 28 wherein said branched particle protrusions are composed of the same chemical composition as said particle.

31. The structure of claim 28 wherein said branched particle protrusions are composed of a different chemical composition than said particle.

32. The structure of claim 31 wherein said particle protrusions are composed of multiple chemical compositions, each composition layered sequentially on a protrusion formed previously.

33. The structure of claim 32 wherein said particle provides a three-dimensional electrical charge spatial template in said media, as determined by said multiple chemical compositions.

34. The structure of claim 24 wherein said particle protrusions are attached to said particle by a low bonding force such that said protrusions can be detached upon treatment by at least one of exposure to high intensity ultrasound waves and insertion into liquid.

35. The structure of claim 34 wherein said detachable particle protrusions create nano-particles of under approximately 10 nm in size.

36. The structure of claim 34 wherein said detachable particle protrusions form an electrostatic interaction.

37. The structure of claim 24 wherein said methylated sites of said particle are demethylated and a second set of protrusions of an opposite charge from the first set of protrusions is added, so as to form a particle with two sets of protrusions of opposite charges.

38. The structure of claim 1 wherein said particle has acquired a charge through a double electric layer so as to be capable of electrostatic interaction with regions of a third component.

39. The structure of claim 1 wherein said particle is capable of charge reversal according to the pH of the environment.

40. The structure of claim 1 wherein said particle is used for directed action on microorganisms of different types.

41. The structure of claim 1 wherein said particle is capable of interaction with at least one of affected cell regions or bacteria, while said particle retains high absorption capacity and selectivity.

42. The structure of claim 1 wherein said particle is capable of adsorbing the toxic substances formed as a result of vital activity and decomposition of a biosystem.

43. The structure of claim 1 wherein said particle is provided with dual action, such that any biological function caused by the presence of said particle is followed by a process of at least one of toxic result neutralization, absorption and destruction.

44. The structure of claim 1 wherein said particle is characterized by a broad interaction spectrum, from intermolecular to chemical, with at least one of the environment and the boundary of any system located in it.

45. The structure of claim 1 wherein said particle exhibits, on appearance of a third

component of said three-sided biological system, active, self-organizing properties, thereby responding adequately and selectively to the appearance of said third component and to its charge state, thereby forming a localized stable three component system.

46. The structure of claim 1 wherein said particle exhibits selectivity of particle action depending on the size and shape of an object, on the charge, on the hydrophilic-hydrophobic pattern and on the availability of functional groups.

47. The structure of claim 1 wherein said particle enables structurization of the bioenvironment with formation of at least one of locally non-homogeneous regions and nano-size fluctuations, interacting through a network of three dimensional bonds containing an inorganic particle.

48. The structure of claim 1 wherein said particle forms said three-sided biological system in which said surrounding media comprises structured thixotropic biofluids, said system acting as an analog of membranes impeding the transport of bacteria, of their nutrients and of dissolved inorganic compounds and ions.

49. The structure of claim 48 wherein said particle forms a stable three-dimensional structure in a thixotropic environment when in contact with an inanimate component and forms an unstable structure which has variable thixotropy when in contact with a living component.

50. The structure of claim 1 wherein said particle is provided with the capacity to be adsorptive and chemisorptive and to form chelates allowing inorganic and organic components to be isolated.

51. The structure of claim 50 wherein said particle has adsorptive capacity for interaction with hydrophobic-hydrophilic regions of bio-objects as well as for specific interaction with components of a living environment.

52. The structure of claim 1 wherein said particle is a combination of positively and negatively charged particles provided for encapsulation of bacteria.

53. The structure of claim 10 wherein said particle has said hydrophilic particles that are used to inactivate bacteria inside a block of structurized water, with practical disruption of the link between the bacteria and the environment.

54. The structure of claim 10 wherein said particle is used for and at least one of intermolecular interaction with hydrophobic regions of membranes, supply and removal of oils.

55. The structure of claim 10 wherein said particle is provided with a specific hydrophobic-hydrophilic balance on the surface permitting formation of a branched

three-dimensional network in a system of non-interactive hydrophobic-hydrophilic environments across the surface of a solid body.

56. The structure of claim 10 wherein said particle is provided with a given hydrophobic-hydrophilic balance on the surface causing chemical reactions over specific surface hydroxyl groups with metal chlorides, creating highly non-uniform heterogeneous environments with new thixotropic properties, different charges, different photochemical abilities and other changed properties.

57. The structure of claim 24 wherein said particle is formed with a series of layers of active ingredients which are encapsulated in slow-release covers.

58. The structure of claim 52 wherein said particle has active ingredients that are released in sequence and a final active ingredient absorbs the results of the reaction.

59. The structure of claim 24 wherein said particle protrusions form a "lock and key" system whereby an ionic channel is shut, encapsulating a microbe and shielding it from the environment.

60. The structure of claim 10 wherein said surface hydroxyl groups are replaced with at least one of inorganic radicals, and organic radicals including the group of amines, alcohols, iodine, and bromine, leading to formation of bonds of the donor acceptor type,

complexes with coordination type charge transfer, covalent bonds and dispersion interaction with the functional radicals of a bio-object.

61. The structure of claim 24 wherein said particle is provided in mechanical mixtures of said particles which are differently charged in the presence of water, depending on the pH of the environment, and therefore will interact differently with each other and with specific biomembrane regions.

62. The structure of claim 24 wherein said particle is subjected to mechanical mixing, followed by settling of substances with heterogeneous structures in an aqueous environment leading to formation of xerogels with an ultra-heterogeneous pore structure.

63. A method of modifying the surface of ultra-disperse nano-particles of hydrated oxides by partial methylation, said method comprising the steps of:

heat-treating said particles in an open vessel at an appropriate temperature so as to remove absorbed and bound structural water;

reacting said heat-treated particles with functional organic molecules in the gaseous phase at high temperature so as to methylate surface hydroxyl groups;

removing excess reagent and reaction products;

hydrolyzing unreacted chloride groups on said surface through heating in the presence of saturated water vapor;

heating finally in at least one of an open vessel and an inert atmosphere; and

cooling,

such that said nano-particles become modified by partial methylation of their surface.

64. The method of claim 63 wherein the step of reacting said heat-treated particles is allowed to continue for between approximately 5 and 60 min at a temperature of approximately between 200-300 °C, the length of said exposure determining percentage of said methylation.

65. The method of claim 63 wherein the step of hydrolyzing is effected at a temperature of between approximately 250-300 °C for a period of approximately one hour.

66. The method of claim 63 wherein said final heating step is effected at a temperature of approximately between 200-300 °C.

67. The method of claim 63 further comprising the step of checking percent methylation by IR spectroscopy, said hydroxyl groups appearing at approximately 3750 nm and said methyl groups appearing at approximately 2980 nm.

68. The method of claim 63 further comprising the step of:

etching non-methylated surface sites so as to create interconnected interior channels providing said particles with high surface per unit mass.

69. The method of claim 63 further comprising the step of further modifying said partially methylated particles by building spike-like protrusions on said surface of said particles in areas which have not been methylated, by heat-treating in the presence of a desired component.

70. The method of claim 69 further comprising the step of monitoring control of growth of said protrusions by measuring the intensity of said hydroxyl group peak at 3750 nm through IR spectroscopy.

71. The method of claim 69 wherein said spike-like protrusions are comprised of at least one of SiO_2, Al_2O_3 and TiO_2.

72. The method of claim 69 wherein the step of heat-treating in the presence of SiO_2 takes place at a temperature of at least one of 200°C, 400°C and 650°C.

73. The method of claim 69 wherein the step of heat-treating in the presence of at least one of Al_2O_3 and TiO_2 takes place at a temperature of between approximately 200-400 °C.

74. The method of claim 69 further comprising the steps of:

heating said particles to between approximately 500-700 °C so as to demethylate said methylated areas of said particle surface, thereby also methylating said spike-like protrusions so as to form a protective cap; and

building a second type of protrusion on said demethylated areas, by heat treatment in the presence of a second component,

so that a second type of protrusion is formed on said demethylated areas.

75. The method of claim 74 further comprising the step of:

reiterating partial methylation of said particle so as to produce branched protrusions.

76. The method of claim 63 further comprising the steps of:

creating drops of approximately 50-100 microns with an ultrasound atomizer,

feeding said drops into a chamber with a layer of said hydrophobic particles such that said drops become coated by said particles due to collision forces; and

introducing said coated drops into an emulsion under turbulent mixing,

such that said hydrophobic particles will allow insertion into an oily medium, resulting in an emulsion with a high water content.

77. The method of claim 76 wherein said step of introducing said coated drops takes place in a gas enriched environment so as to create a water-oil-gas emulsion.

78. The method of claim 77 wherein said gas is at least one of air and ozone.

79. The structure of claim 10 wherein a combination of partially hydrophilic and hydrophobic particles are provided in a toothpaste.

80. The structure of claim 79 wherein said partially hydrophilic particles break the adhesive connection between the plaque and the enamel of the tooth.

81. The structure of claim 80 wherein said partially hydrophobic particles adsorb the plaque released by said partially hydrophilic particles.

82. The toothpaste of claim 79 further comprising particles with a negative electrical charge for treatment of inflamed gum tissue.

83. The hydrophobic particle of claim 79 further comprising flouride for direct delivery to the tooth enamel.

84. The toothpaste of claim 79 further comprising flouride.

85. The toothpaste of claim 79 wherein said partially hydrophilic and said partially hydrophobic particles comprise less than approximately 20% of the total weight of said toothpaste.

86. The structure of claim 10 wherein said particle is provided as a combination of hydrophilic and hydrophobic particles that are provided in a chewing gum for use as a dentrifice.

87. The structure of claim 10 wherein said particle is for use in medicinal applications.

88. The structure of claim 10 wherein said particle is for use in cosmetic applications.

89. The structure of claim 10 wherein said particle is for use in hygiene applications.

90. The structure of claim 10 wherein said particle is for use in the food industry.

91. The structure of claim 10 wherein said particle is for use in agricultural applications.

92. The structure of claim 10 wherein said particle is for use in water treatment applications.

93. The structure of claim 10 wherein said particle is for use in disinfection applications.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: EDWARD LANGER
P.O. BOX 410
RAANANA, ISRAEL 43103

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 1037	Date of Mailing *(day/month/year)* 29 OCT 1999 FOR FURTHER ACTION See paragraphs 1 and 4 below
International application No. PCT/IL99/00272	International filing date *(day/month/year)* 20 MAY 1999
Applicant BIO-SEAL LTD.	

1. [X] The applicant is hereby notified that the international search report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the international search report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. [ ] **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

[ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

[ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in rules 90 *bis* 1 and 90 *bis* 3, respectively, before the completion of the technical preparations for international publication.

Within **19 months** from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within **20 months** from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer H. THI LE Telephone No. (703) 308-0651

Form PCT/ISA/220 (January 1994)★ *(See notes on accompanying sheet)*

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 1037	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/IL99/00272	International filing date *(day/month/year)* 20 MAY 1999	(Earliest) Priority Date *(day/month/year)* 21 MAY 1998
Applicant BIO-SEAL LTD.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. [X] **Certain claims were found unsearchable** (See Box I).

2. [ ] **Unity of invention is lacking** (See Box II).

3. [ ] The international application contains disclosure of a **nucleotide and/or amino acid sequence listing** and the international search was carried out on the basis of the sequence listing
   - [ ] filed with the international application.
   - [ ] furnished by the applicant separately from the international application,
     - [ ] but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.
   - [ ] transcribed by this Authority.

4. With regard to the **title**,
   - [X] the text is approved as submitted by the applicant.
   - [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,
   - [X] the text is approved as submitted by the applicant.
   - [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is:
   Figure No. 2
   - [ ] as suggested by the applicant.
   - [ ] because the applicant failed to suggest a figure.
   - [X] because this figure better characterizes the invention.
   - [ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL99/00272

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 1-62 and 79-83
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

A surrounding medium is a medium in which the claimed particle intended to be applied, but such medium is claimed in the body of the claims as a component of the claimed particle. Thus, claims are meaningless, confusing and thus rendered unsearchable.

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL99/00272

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : B32B 5/16
US CL : 428/402, 403; 427/212
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 428/402, 403; 427/212

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WEST 1.2

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4,715,986 A (GRUNING et al) 29 December 1987, entire document.	63-78
A	US 5,618,905 A (MARSELLA et al) 08 April 1997, entire document.	63-78
A	US 5,710,037 A (VANIN et al) 20 January 1998, entire document.	63-78

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search
04 OCTOBER 1999

Date of mailing of the international search report
29 OCT 1999

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231
Facsimile No. (703) 305-3230

Authorized officer
H. THI LE
Telephone No. (703) 308-0651

Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL99/00272

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : B32B 5/16
US CL : 428/402, 403; 427/212
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 428/402, 403; 427/212

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WEST 1.2

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 5,710,037 A (VANIN et al) 20 January 1998, entire document.	63-78

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*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 04 OCTOBER 1999	Date of mailing of the international search report 29 OCT 1999
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer H. THI LE Telephone No. (703) 308-0651

Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL99/00272

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 1-62 and 79-83
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

A surrounding medium is a medium in which the claimed particle intended to be applied, but such medium is claimed in the body of the claims as a component of the claimed particle. Thus, claims are meaningless, confusing and thus rendered unsearchable.

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.